

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
23 December 2004 (23.12.2004)

PCT

(10) International Publication Number
WO 2004/110657 A2

(51) International Patent Classification⁷: **B08B 3/12**

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(21) International Application Number:
PCT/EP2004/051020

(22) International Filing Date: 3 June 2004 (03.06.2004)

(25) Filing Language: English

Declarations under Rule 4.17:

(26) Publication Language: English

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

(30) Priority Data:
60/478,308 12 June 2003 (12.06.2003) US

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US*

(71) Applicant (for all designated States except US): **SEZ AG** [AT/AT]; Draubodenweg 29, A-9500 Villach (AT).

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US*

(72) Inventors; and
(75) Inventors/Applicants (for US only): **FERRELL, Gary W.** [US/US]; 5084 La Honda Road, San Gregorio, California 94074 (US). **SCHIPPER, John F.** [US/US]; 3133 Flowers, Palo Alto, California 94306 (US). **RATRA, Jagjit S.** [US/US]; 1454 Inwood Court, Campbell, California 95008 (US).

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US*

(74) Agent: **KONTRUS, Gerhard**; c/o SEZ AG, Draubodenweg 29, A-9500 Villach (AT).

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US*

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

— *of inventorship (Rule 4.17(iv)) for US only*

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/110657 A2

(54) Title: **UNIFORM CAVITATION FOR PARTICLE REMOVAL**

(57) Abstract: Systems and methods for promoting a substantially uniform cavitation field. With system (100) including a diaphragm (109) dividing a container (103), a second energy pulse corresponding to a first energy pulse arising from collapse of a cavity C is produced and is used to determine whether to adjust a corresponding transducer 121-k. In system (16), a cavity creating unit (11), including an assembly of transducers 15-i, is moveable from a test liquid to a particle removal (PR) liquid after transducer testing. In another system, a sensor plate (170) having an array of sensors 171-j provides a virtual wafer. A substantially uniform field of cavitation may be maintained by a cavity enhancement liquid, or adjustment of transducer energy. Mechanisms of holding an object produce substantially uniform cavitation. Opposed transducers in a container having monotonically decreasing and/or increasing cavitation density produce substantially uniform cavitation density.